

WHAT IS CLAIMED IS:

1. An isolated, recombinant polypeptide molecule comprising a first amino acid sequence which is a fragment of a native proteolipid protein having a wild type or mutant sequence as compared with the native sequence of said proteolipid protein, and optionally comprising a second amino acid sequence fused in frame thereto to create a fusion polypeptide, which first polypeptide is encoded by an mRNA having an Internal Ribosome Entry Site ((IRES) wherein translation of the mRNA initiates at said IRES, such that the N-terminal amino acid residue of said first polypeptide corresponds to an internal residue of said proteolipid protein.
2. The polypeptide of claim 1 or wherein the proteolipid protein is human PLP/DM20.
3. The first polypeptide or of claim 1 selected from the group consisting of:
 - (a) PIRP-M, having the amino acid sequence SEQ ID NO:6;
 - (b) PIRP-L, having the amino acid sequence SEQ ID NO:8;
 - (c) a fusion polypeptide of (a) or (b) wherein said second amino acid sequence encodes a naturally fluorescent protein or peptide;
 - (d) a His-tagged fusion polypeptide of PIRP-M having the amino acid sequence SEQ ID NO:12;
 - (e) a His-tagged fusion polypeptide of PIRP-L having the amino acid sequence SEQ ID NO:16; and
 - (f) PIRP-J having a mutant sequence compared to said proteolipid protein, the sequence of said PIRP-J being SEQ ID NO:18, or a human homologue thereof.
4. The polypeptide of claim 3 which is PIRP-M having the amino acid sequence SEQ ID NO:6
5. The polypeptide of claim 3 which is PIRP-L, having the amino acid sequence SEQ ID NO:8.
6. The polypeptide of claim 3 which is PIRP-J having the amino acid sequence SEQ ID NO:18.
7. The fusion polypeptide of claim 3 wherein said fluorescent protein is yellow or green green fluorescent protein (GFP) or a fluorescent homologue thereof.
8. The His-tagged fusion polypeptide of claim 3 having the sequence SEQ ID NO:12.
9. The His-tagged fusion polypeptide of claim 3 having the sequence SEQ ID NO:16.
10. An isolated nucleic acid encoding the polypeptide of claim 1, the mutant sequence thereof, or the fusion polypeptide thereof.

11. The nucleic acid of claim 10 which is a DNA molecule.

12. The nucleic acid of claim 10 which is an RNA molecule.

13. The nucleic acid of claim 10 wherein the proteolipid protein is human PLP/DM20.

14. The nucleic acid of claim 10 encoding a polypeptide or fusion polypeptide selected from the group consisting of:

(a) PIRP-M, having the amino acid sequence SEQ ID NO:6;

(b) PIRP-L, having the amino acid sequence SEQ ID NO:8;

(c) a fusion polypeptide of (a) or (b) wherein said second amino acid sequence encodes a naturally fluorescent protein or peptide;

(d) a His-tagged fusion polypeptide of PIRP-M having the amino acid sequence SEQ ID NO:12;

(e) a His-tagged fusion polypeptide of PIRP-L having the amino acid sequence SEQ ID NO:16; and

(f) PIRP-J having a mutant sequence compared to said proteolipid protein, the sequence of said PIRP-J being SEQ ID NO:18, or a human homologue thereof.

15. The nucleic acid of claim 14 which encodes PIRP-M and has a nucleotide sequence SEQ ID NO:5 or SEQ ID NO:9.

16. The nucleic acid of claim 14 which encodes PIRP-L and has a nucleotide sequence SEQ ID NO:7 or SEQ ID NO:13.

17. The nucleic acid of claim 14 which encodes PIRP-J and has a nucleotide sequence SEQ ID NO:17.

18. The nucleic acid of claim 14 which encodes said His-tagged fusion polypeptide of PIRP-M, which nucleic acid has a nucleotide sequence SEQ ID NO:11;

19. The nucleic acid of claim 14 which encodes said His-tagged fusion polypeptide of PIRP-L, which nucleic acid has a nucleotide sequence SEQ ID NO:15;

20. The nucleic acid of claim 14 which encodes said fusion polypeptide wherein said second amino acid sequence encodes a naturally fluorescent protein or peptide.

21. The nucleic acid of claim 20 wherein said fluorescent protein is yellow or green green fluorescent protein (GFP) or a fluorescent homologue thereof.

22. The nucleic acid molecule of any of claims 10-21 operatively linked to a promoter.

23. The nucleic acid molecule of claim 22, wherein the promoter is one which is expressed in a mammalian cell.
24. The nucleic acid molecule of claim 23 wherein said mammalian cell is a neuronal cell, a glial cell or a stem cell.
- 5 25. The nucleic acid molecule of claim 24 wherein said glial cell is an oligodendrocyte.
26. The nucleic acid molecule of claim 24 wherein the stem cell is a neural stem cell, an oligodendrocyte progenitor cell, an embryonic stem cell or a hemopoietic stem cell.
27. A vector comprising the nucleic acid of any of claims 10-21.
28. The vector of claim 27, selected from the group consisting of PLP-GFP/DM20-GFP;
 10 PLP-GFP/DM20-GFP Tet-On; PLP-GFP/DM20-GFP M1L; PLP-GFP/DM20-GFP M1L/M205L;
 PLP-GFP/DM20-GFP M1L/M234L; PLP-GFP/DM20-GFP M1L/M205L/M234L; PLP-GFP/DM20-GFP
 Pro-; JPLP-GFP/JDM20-GFP; JPLP-GFP/JDM20-GFP M1L; JPLP-GFP/JDM20-GFP M1L/M205L;
 RshPLP-GFP/RshDM20-GFP M1L; PLP-GFP/DM20-GFP M1L/K268R;
 PLP-GFP/DM20-GFP M1L/K275R; PLP-GFP/DM20-GFP M1L/K268R/K275R; and
 15 PLP-GFP/DM20-GFP M1L/R272K
29. An expression vector or cassette comprising the nucleic acid of any of claims 10-21 operatively linked to
- (a) a promoter; and
- (b) optionally, additional regulatory sequences that regulate expression of said nucleic acid
 20 in a eukaryotic cell.
30. The expression vector or cassette of claim 27 comprising a vector selected from the group consisting of pCMV; pEGFP-N1; pEYFP-N1; pEGFP-Tet-On; pBluescript II KS+; and pET-14b.
31. The expression vector or cassette of claim 28 elected from the group consisting of 205M-
 25 CMV/234M-CMV; 205M-His-CMV/234M-His-CMV; 205M-BsKS+/234M-BsKS+; 205M-His-BsKS+/
 234M-His-BsKS+; and 205M-ET-14b/234M-ET-14b.
32. A cell which has been modified to comprise the nucleic acid of any of claims 10-21.
33. The cell of claim 32 which is a mammalian cell.
- 30 34. A cell which has been modified to comprise the vector of claim 27.

35. A cell which has been modified to comprise the vector or expression cassette of claim 31.
36. The cell of claim 35 which expresses said nucleic acid molecule.
37. The cell of claim 36 which is mammalian cell
38. The cell of claim 37 wherein said mammalian cell is a neuronal cell, a glial cell or a stem cell.
- 5 39. The cell of claim 38 wherein said glial cell is an oligodendrocyte.
- 40.. The cells of claim 38 wherein the stem cell is a neural stem cell, an oligodendrocyte progenitor cell, an embryonic stem cell or a hemopoietic stem cell.
41. A pharmaceutical composition, comprising:
(a) pharmaceutically acceptable excipient in combination with
10 (b) the polypeptide of any of claims 1-6.
42. A pharmaceutical composition, comprising:
(a) pharmaceutically acceptable excipient in combination with
(b) the nucleic acid molecule of claims 23.
43. A pharmaceutical composition, comprising:
15 (a) pharmaceutically acceptable excipient in combination with
(b) the expression vector or cassette of claim 29;
44. A pharmaceutical composition, comprising:
(a) pharmaceutically acceptable excipient in combination with
(b) the cell of claim 33.
- 20 45. A pharmaceutical composition, comprising:
(a) pharmaceutically acceptable excipient in combination with
(b) the cell of claim 36.